

SERVICE MANUAL

TTL MONOCHROME MONITOR

MODEL:HMM-1200



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SPECIFICATION

1. Input Signal

Video Signal (Intensity)	TTL Level Positive
Sync Signal	Horizontal and Vertical Sync TTL LEVEL
Resolution	720 DOT (H) × 350 Lines (V)
Retrace Time	Horizontal : 8uS MAX Vertical : 0.9mS MAX

2. Recommended Display

Characters	2000 Characters (80Characters × 25 Rows)
Sweep Frequency	Horizontal : 18.432KHZ Vertical 50Hz
Display Area	205 mm (H) × 150 mm (V)

3. Input Power

120V 50/60HZ only (AC 220V 50HZ only)

4. Power Consumption

35W

5. Picture

12" Diagonal 90 Degree

6. Input Terminal

9 Pin D-subminiature Connector

7. Weight

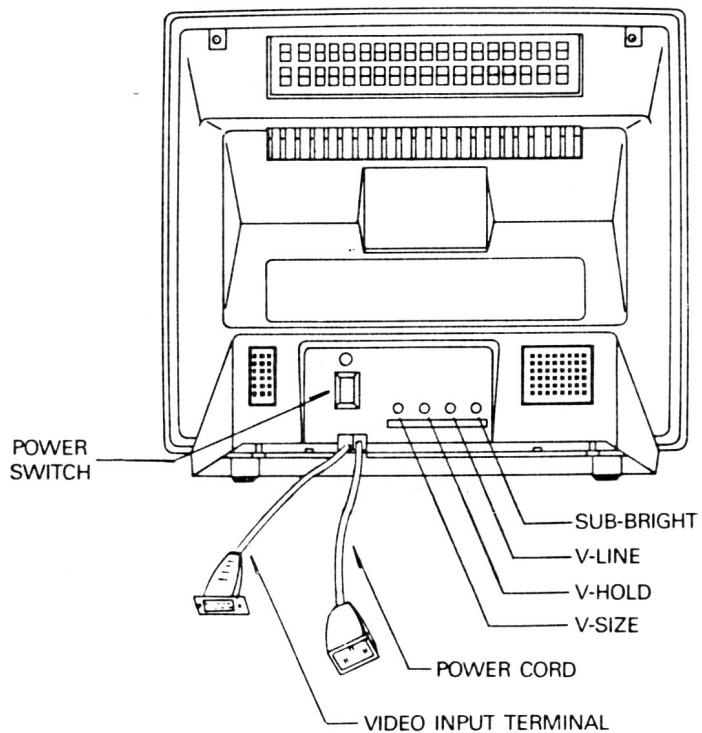
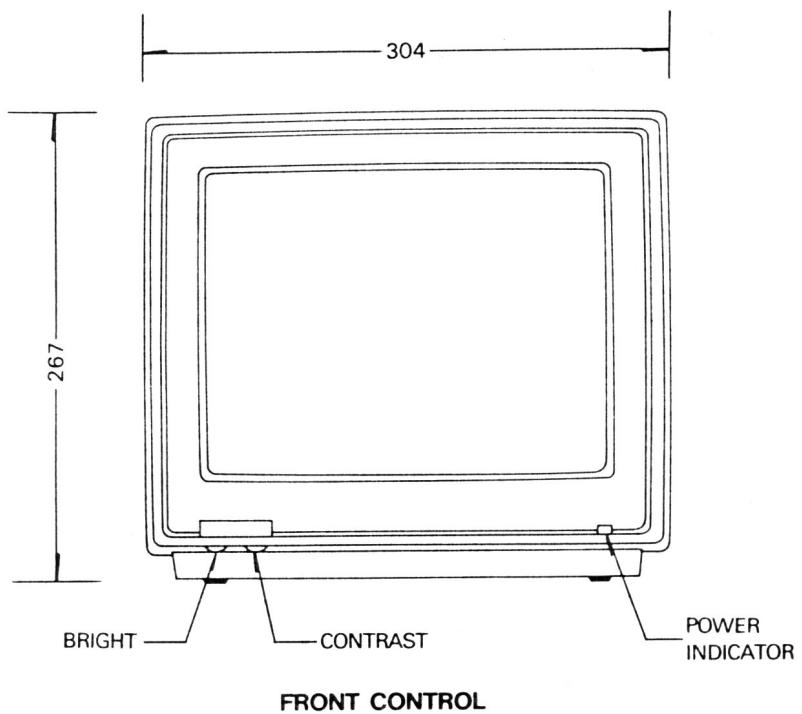
7Kg/15.41bs

Dimension

304 × 267 × 312 mm

NOTE : Specifications are subject to change without notice.

CONTROL DESCRIPTION



REAR CONTROL

1. Contrast

This increases the brightness of only black & white when turned clockwise, and decreases the brightness of black & white when turned counterclockwise.

2. Bright

This controls the brightness of the entire screen.

3. Power Switch

Press the "I" position of switch to turn the power on.

Press the "O" position of switch to turn the power off.

Power switch does not exist in some cases, because it is optional.

4. Power Indicator

This indicator lights when the display is on.

5. Power Cable

Plug this power cable into an 120V or, 220V Electrical outlet.

6. Input Connector

This is used to feed the signal from the computer.

7. V-Hold

This control is used to obtain stability of the screen picture. Use this knob when the screen picture does not hold.(Adjust with a screw driver)

8. V-Size

Rotating this control counterclockwise will make the screen longer upwards and downwards.(Adjust with a screw driver)

9. V-Linearity

Rotating this control counterclockwise will make the symmetrical size of upwards and downwards. (Adjust with a screw driver)

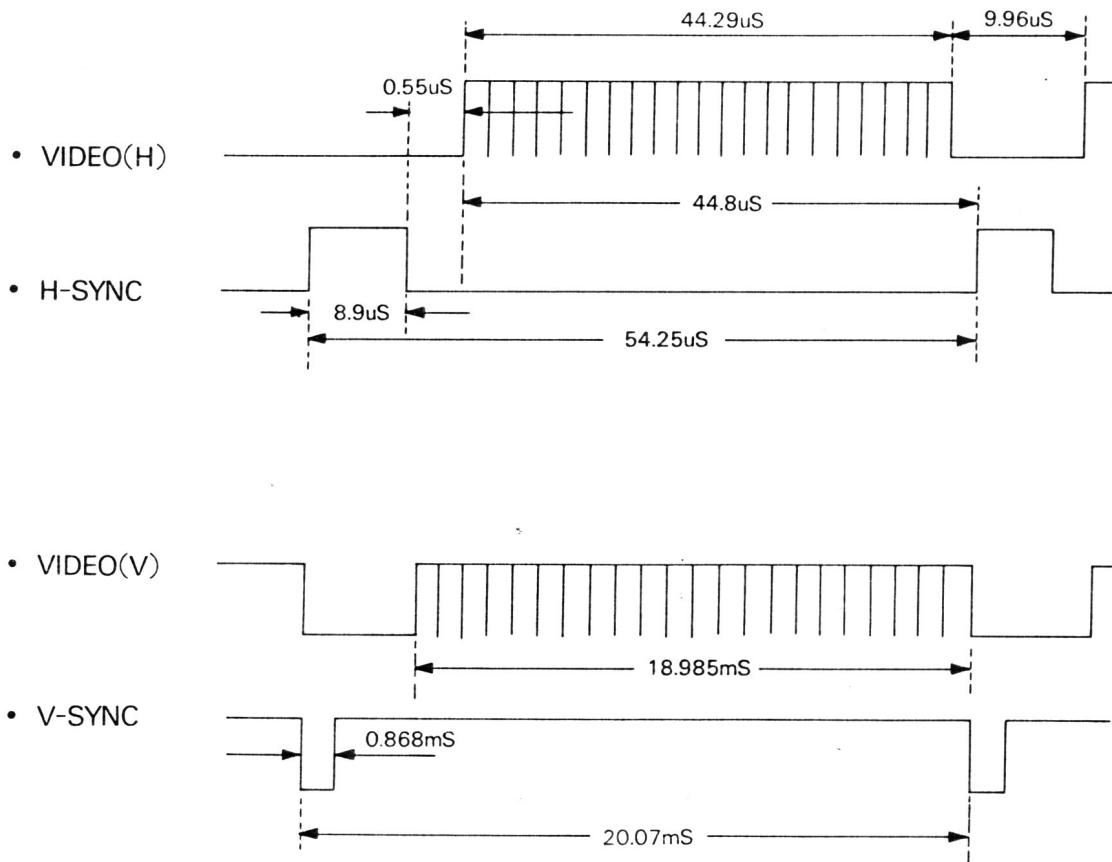
VIDEO INPUT SIGNAL

Recommended signals are shown below

1. Signal level

Video input	: TTL level
Intensity	TTL level
Sync input	: H-sync : TTL level V-sync : TTL level

2. Wave form



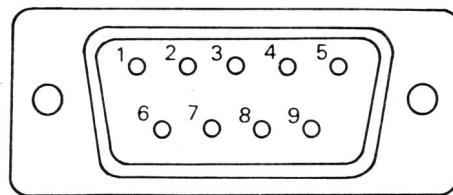
VIDEO INPUT TERMINAL

A 9 pin D-sub connector is used as the input signal connector.
Pin and input signals are shown in the table below.

PIN CONNECTION

PIN NO.	CONNECTION
1	GND
2	GND
3	
4	
5	
6	INTENSITY
7	VIDEO
8	HORIZONTAL SYNC
9	VERTICAL SYNC

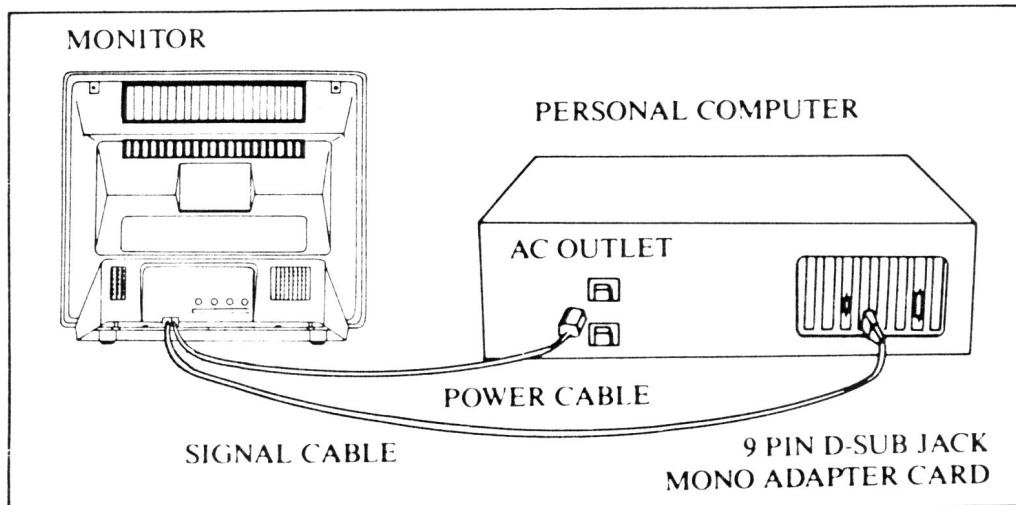
D-SUBMINIATURE CONNECTOR



CONNECTING WITH EXTERNAL EQUIPMENT

CAUTIONS

Be sure to turn off the power of your computer before connecting the monitor.

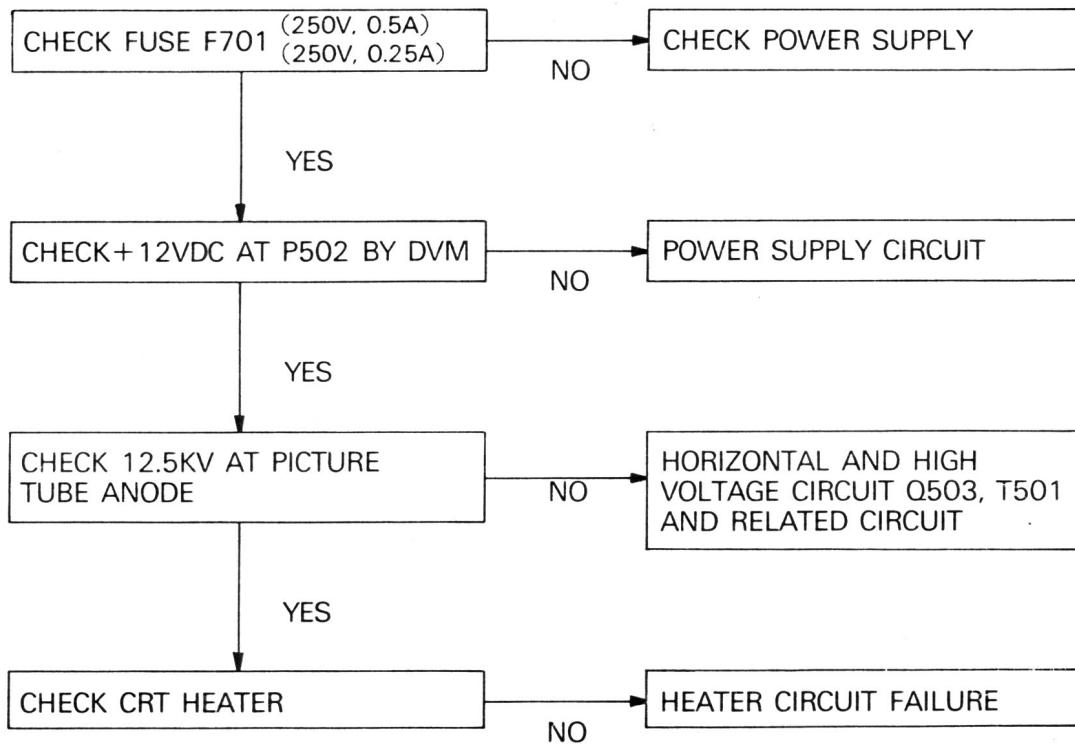


If signals other than those recommend are received,
one or more of the following phenomenon may be experienced.

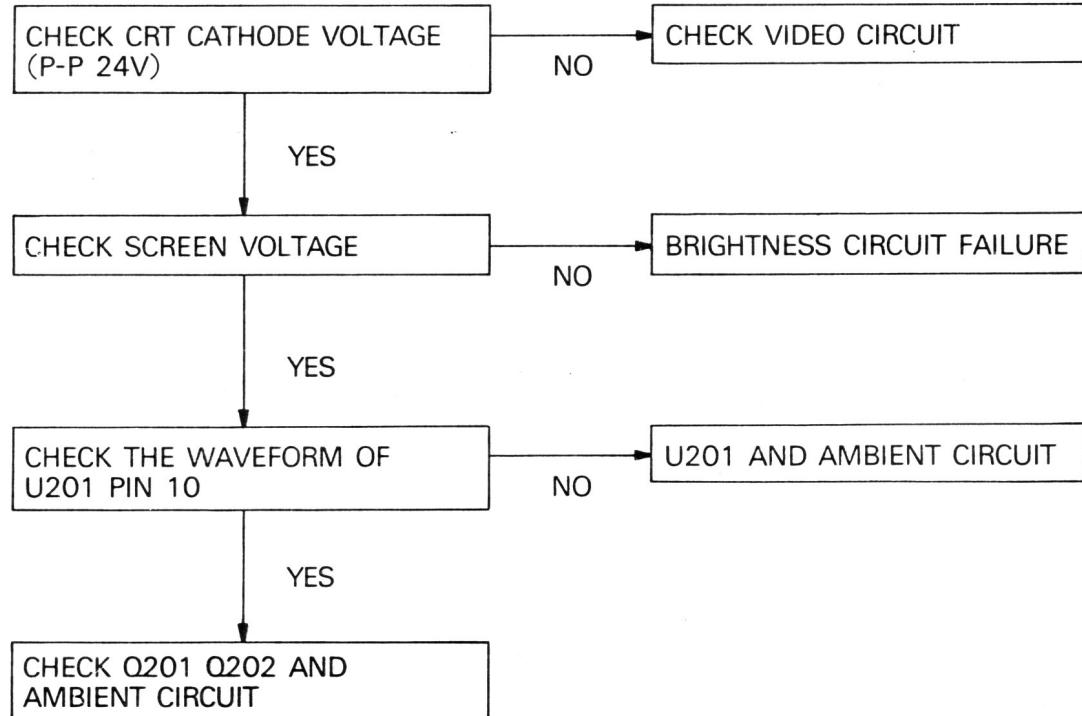
Phenomenon	Cause	Phenomenon	Cause
Picture width too wide 	Data display period is more than 44.29μS	Height of picture too much extended 	Vertical flyback period is 20H or less.
Picture width too narrow 	Data display period 44.29μS or less.	Picture rolls vertically (upward and downward) 	Vertical sync frequency is not set to 50Hz.
Height of picture too shortened. 	Vertical flyback period is 20H or more.		

TROUBLE SHOOTING

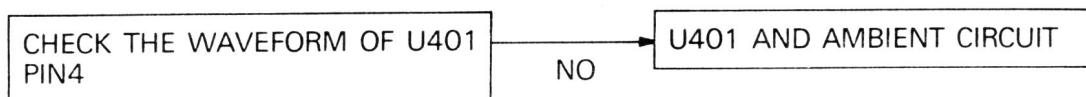
1. NO RASTER



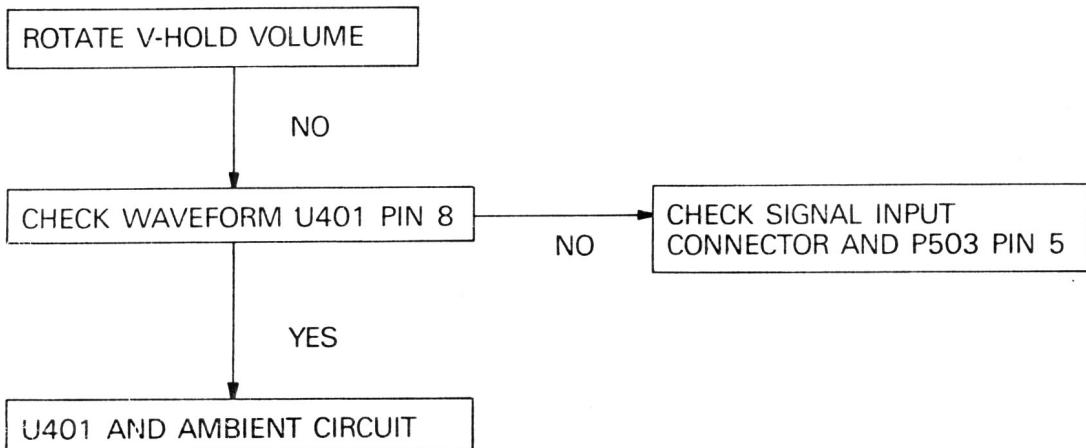
2. NO PICTURE



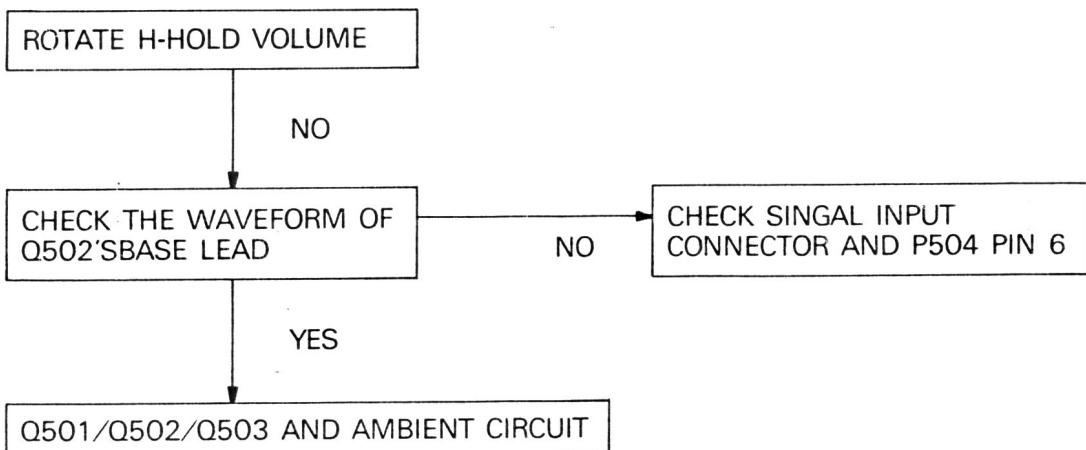
3. VERTICAL DEFLECTION FAILURE



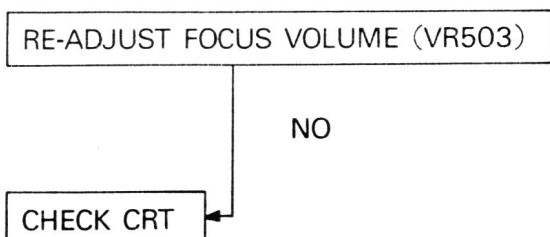
4. VERTICAL SYNC FAILURE



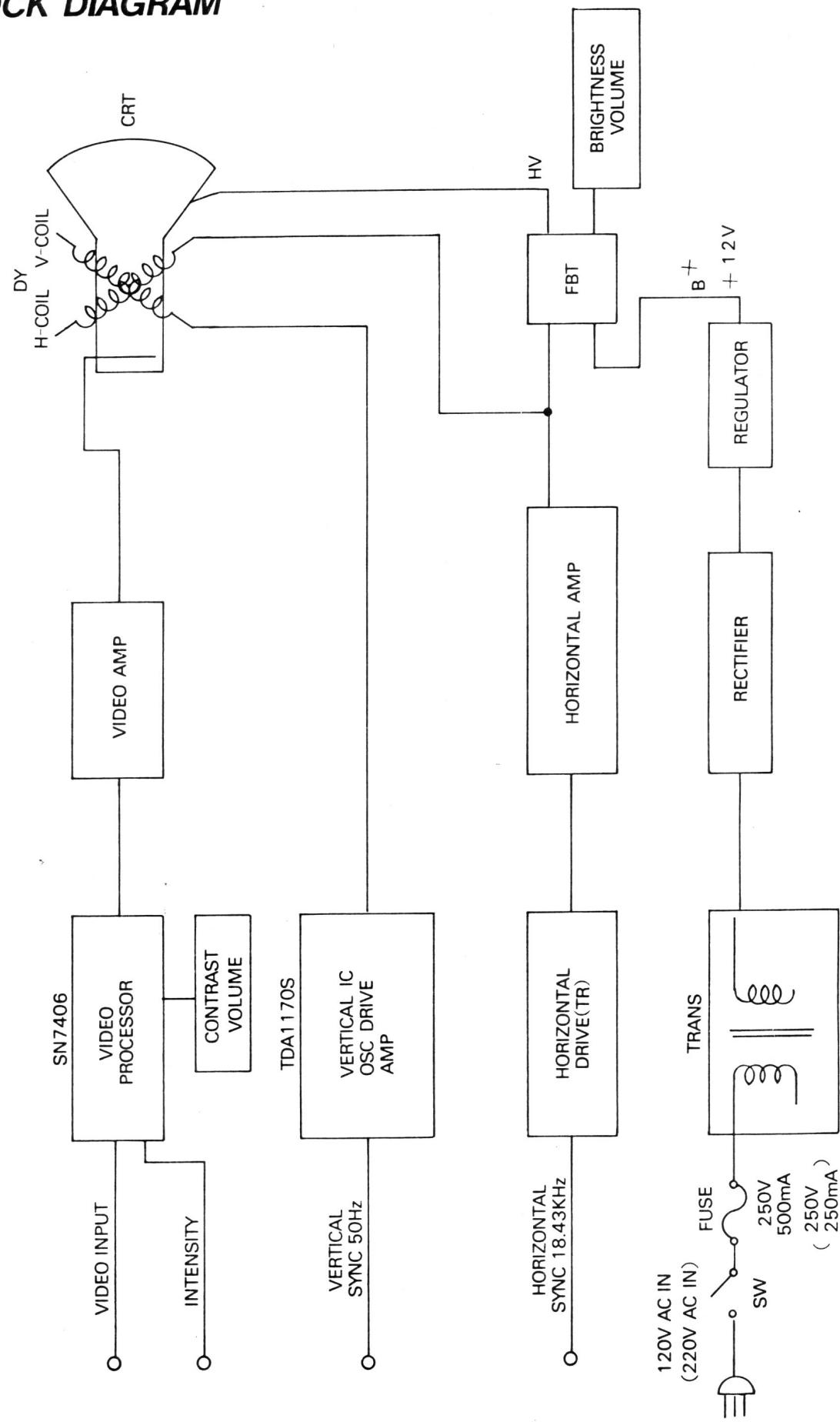
5. HORIZONTAL SYNC FAILURE



6. FOCUS



BLOCK DIAGRAM



REPLACEMENT PARTS LIST

PRODUCT SAFETY NOTICE : COMPONENTS MARKED WITH A  HAVE SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY, BEFORE REPLACING ANY OF THESE COMPONENTS. DONT DEGRADE THE SAFETY OF THE SET THROUGH IMPROPER SERVICING.

ABBREVITION :

RD	R-CARBON	CK	C-CERAMIC. HK
RS	R-METAL, OXIDE	CE	C-ELECTROLYTIC
RX	R-CEMENT	CC	C-CERAMIC, TEMP
		CQ	C-POLYESTER, C-POLYPROPYLENE
		CS	C-TANTL, SOLID

1. IC

NO.	PARTS CODE	PART NAME	DESCRIPTION	LOCATION
1	U7406N----	IC, TTL	SN7406N/HD7406P	U201
2	UTDA1170N---	IC	TDA1170N	U401

2. TRANSISTOR

NO.	PARTS CODE	PART NAME	DESCRIPTION	LOCATION
3	TNKTC1815Y---	TRANSISTOR	KTC1815Y	Q501
4	TNKTC1959Y---	TRANSISTOR	KTC1959Y	Q502
5	TNBU806----	TRANSISTOR	BU806	Q503
⚠ 6	TNKTC1959Y---	TRANSISTOR	KTC1959Y	Q702
7	TNKTA1015Y---	TRANSISTOR	KTA1015Y	Q703
8	TNBF258----	TRANSISTOR	BF258	Q201
9	TNKTC1815Y---	TRANSISTOR	KTC1815Y	Q202
⚠ 10	TNKTB595Y----	TRANSISTOR	KTB595Y	Q701

3. DIODE

NO.	PARTS CODE	PART NAME	DESCRIPTION	LOCATION
11	DTIN4733A---	DIODE, ZENER	5, 1V 1W 5®	D201
12	DTIN4148----	DIODE	1N4148	D202
13	DTIN4148----	DIODE	1N4148	D203
14	DTIN4148----	DIODE	1N414	D401
15	DTIN4002----	DIODE	1N4002	D402
16	DTIN4002----	DIODE	1N4002	D501
⚠ 17	DTRGP10J----	DIODE	REP10J(IN4937)	D502
18	DTRGP15J----	DIODE	REP15J	D503
19	DTRGP10K----	DIODE	REP10K(BA159)	D504
20	DTRGP10D----	DIODE	REP10D(IN4935)	D505
21	DTRGP10D----	DIODE	REP10D(IN4935)	D506
⚠ 22	DNRS202----	BRIDGE DIODE	RS202	D701
23	DTBZ+83-C4V7	DIODE, ZENER	4.7V 0.5W 6%	D702
24	DT1N4148----	DIODE	1N4148	D703
25	DTBZ+B3-C5V1	DIODE, ZENER	5.1V 0.5W 6%	D204
26	DT1N4002----	DIODE	1N4002	D205
27	DNKLG205E---	LED	KLG205E	D704

4. RESISTOR

NO.	PARTS CODE	PART NAME	DESCRIPTION	LOCATION
28	RD-4POT0101J	RESISTOR, CF	RD 1/4W 100 OHM J	R201
29	RD-4POT0471J	RESISTOR, CF	RD 1/4W 470 OHM J	R202
30	RD-4POT0121J	RESISTOR, CF	RD 1/4W 120 OHM J	R203
31	RD-4POT0332J	RESISTOR, CF	RD 1/4W 3.3K OHM J	R204

NO.	PARTS CODE	PART NAME	DESCRIPTION	LOCATION
32	RD-4POT0472J	RESISTOR, CF	RD 1/4W 4.7K OHM J	R204
33	RD-4POT0332J	RESISTOR, CF	RD 1/4W 3.3K OHM J	R206
34	RD-4POT0151J	RESISTOR, CF	RD 1/4W 150 OHM J	R207
35	RD-4POT0102J	RESISTOR, CF	RD 1/4W ,1K OHM J	R208
36	ROS2P0F0820J	RESISTOR, MOF	RD 1/4W 82 OHM J	R209
37	RD-4POT0682J	RESISTOR, CF	RD 1/4W 6.8K OHM J	R401
38	RD-4POT0222J	RESISTOR, CF	RD 1/4W 2.2K OHM J	R402
39	RD-4POT0183J	RESISTOR, CF	RD 1/4W 18K OHM J	R403
40	RD-4POT0823J	RESISTOR, CF	RD 1/4W 82K OHM J	R404
41	RD-4POT0333J	RESISTOR, CF	RD 1/4W 33K OHM J	R405
42	RD-4POT0185J	RESISTOR, CF	RD 1/4W 1.8M OHM J	R406
43	RD-4POT0154J	RESISTOR, CF	RD 1/4W 150K OHM J	R407
44	RD-4POT0564J	RESISTOR, CF	RD 1/4W 560K OHM J	R408
45	RD-4POT0204J	RESISTOR, CF	RD 1/4W 200K OHM J	R409
46	RD-4POT0472J	RESISTOR, CF	RD 1/4W 4.7K OHM J	R410
47	RD-4POT0472J	RESISTOR, CF	RD 1/4W 4.7K OHM J	R411
48	RD-4POT03R9J	RESISTOR, CF	RD 1/4W 3.9 OHM J	R412
49	RD-4POT0472J	RESISTOR, CF	RD 1/4W 4.7K OHM J	R413
50	RD-4POT01R0J	RESISTOR, CF	RD 1/4W 1.0 OHM J	R414
51	RD-4POT0181J	RESISTOR, CF	RD 1/4W 180K OHM J	R415
52	RD-2POT0560J	RESISTOR, CF	RD 1/2W 56 OHM J	R501
53	RD-4POT0472J	RESISTOR, CF	RD 1/4W 4.7K OHM J	R502
54	RD-4POT0331J	RESISTOR, CF	RD 1/4W 330 OHM J	R503
55	RD-4POT0123J	RESISTOR, CF	RD 1/4W 12K OHM J	R504
56	RD-4POT0681J	RESISTOR, CF	RD 1/4W 680 OHM J	R505
57	RD-4POT0470J	RESISTOR, CF	RD 1/4W 47 OHM J	R506
58	RD-4POT0331J	RESISTOR, CF	RD 1/4W 330 OHM J	R507
59	RD-4POT0102J	RESISTOR, CF	RD 1/4W 1.0K OHM J	R508
60	RD-4POT0104J	RESISTOR, CF	RD 1/4W 100K OHM J	R509
61	RD-4POT0683J	RESISTOR, CF	RD 1/4W 68K OHM J	R510
62	RD-2POT0104J	RESISTOR, CF	RD 1/2W 100K OHM J	R511
63	RD-4POT0184J	RESISTOR, CF	RD 1/4W 180K OHM J	R512
64	RD-4POT0104J	RESISTOR, CF	RD 1/4W 100K OHM J	R513
65	RD-4POT0101J	RESISTOR, CF	RD 1/4W 100 OHM J	R517
66	RD-4POT03R3J	RESISTOR, CF	RD 1/4W 3.3 OHM J	R518
67	RD-4POT0220J	RESISTOR, CF	RD 1/4W 22 OHM J	R519
68	RD-4POT0122J	RESISTOR, CF	RD 1/4W 1.2K OHM J	R701
69	RD-4POT0272J	RESISTOR, CF	RD 1/4W 2.7K OHM J	R702
70	RD-4POT0151J	RESISTOR, CF	RD 1/4W 150 OHM J	R703
71	RD-4POT0561J	RESISTOR, CF	RD 1/4W 560 OHM J	R704
72	RD-4POT0682J	RESISTOR, CF	RD 1/4W 6.8K OHM J	R705
73	RS01POS0121J	RESISTOR, MOF	RS 1W 120 OHM J	R706
74	RS01POS0680J	RESISTOR, MOF	RS 1W 68 OHM J	R707
75	RS02POS0560J	RESISTOR, MOF	RS 2W 56 OHM J	R708
76	RD-4POT0152J	RESISTOR, CF	RD 1/4W 1.5K OHM J	R709
77	RD-4POT0470J	RESISTOR, CF	RD 1/4W 47 OHM J	R210
78	RD-4POT0470J	RESISTOR, CF	RD 1/4W 47 OHM J	R211
79	RD-4POT0471J	RESISTOR, CF	RD 1/4W 470 OHM J	R212
80	RD-4POT0820J	RESISTOR, CF	RD 1/4W 82 OHM J	R213
81	POS0821J	RESISTOR, MOF	RS 2W 820 OHM J	R214

NO.	PARTS CODE	PART NAME	DESCRIPTION	LOCATION
82	RD-2POT0822J	RESISTOR, CF	RS 1/2W 8.2K OHM J	R215
83	RD-2POT0221J	RESISTOR, CF	RD 1/2W 220 OHM J	R216
84	RD-4POT0391J	RESISTOR, CF	RD 1/4W 390 OHM J	R217
85	RD-2POT03R9J	RESISTOR, CF	RD 1/2W 3.9 OHM J	R514
86	RD-2POT0104J	RESISTOR, CF	RD 1/2W 100K OHM J	R515
87	RD-4POT0106J	RESISTOR, CF	RD 1/4W 10M OHM J	R516
88	E42015003190	VOLUME, SEMI	H1052A B 100K OHM J	VR401
89	E42015003190	VOLUME, SEMI	H1052A B 100K OHM J	VR402
90	E42015003022	VOLUME, SEMI	H1052A B 330K OHM J	VR403
91	E42015003210	VOLUME, SEMI	H1052A B 220K OHM J	VR501
92	E42015005270	VOLUME, SEMI	H1022A B 2.2M OHM J	VR503
⚠ 93	E42015005070	VOLUME, SEMI	H1021A B 1K OHM J	VR701
94	E42017001270	VOLUME, SEMI	K16110 B 500 OHM J	VR201
95	E42017001340	VOLUME, SEMI	K16110 B 100K OHM L=15	VR502

5. CAPACITOR

NO.	PARTS CODE	PART NAME	DESCRIPTION	LOCATION
96	CE04AN1C470M	CAPACITOR, EL	CE04SM 16V 47UF M	C201
97	CE04AN1C221M	CAPACITOR, EL	CE04SM 16V 220UF M	C202
98	CQ92BN2A103K	CAPACITOR, PE	CQ92 100V 0.01UF K	C203
99	CQ92BN2A103K	CAPACITOR, PE	CQ92 100V 0.01UF K	C401
100	CQ92BN2A104K	CAPACITOR, PE	CQ92 100V 0.1UF K	C402
101	CQ92BN2A104K	CAPACITOR, PE	CQ92 100V 0.1UF M	C403
102	CE04AN1E101M	CAPACITOR, EL	CE04SM 25V 100UF M	C404
103	CQ92BN2A103K	CAPACITOR, PE	CQ92 100V 0.01UF K	C405
104	CQ92BN2A154J	CAPACITOR, PE	CQ92 100V 0.15UF J	C406
105	CC45CN1H470J	CAPACITOR, CD	CC45CH 50V 47PF J	C408
106	CE04AN1C101M	CAPACITOR, EL	CE04SM 16V 100UF M	C409
107	CQ92BN2A104K	CAPACITOR, PE	CQ92 100V 0.1UF K	C410
108	CE04AN1A222M	CAPACITOR, EL	CE04SM 10V 2200UF M	C411
109	CE04AN1C101M	CAPACITOR, EL	CE04SM 16V 100UF M	C501
110	CE04AN1H4R7M	CAPACITOR, EL	CE04SM 50V 4.7UF M	C502
111	CE04AN1H2R2M	CAPACITOR, EL	CE04SM 50V 2.2UF M	C503
112	CK45BN2H221K	CAPACITOR, CD	CK45B 500V 220PF K	C504
113	E42007001080	CAPACITOR, EL	NPHF 25V 10UF K	C505
⚠ 114	CQ93PF2G183J	CAPACITOR, PP	CQ93 400V 0.018UF J	C506
115	CE04AN1C101M	CAPACITOR, EL	CE04SM 16V 100UF M	C507
116	CE04AN1C101M	CAPACITOR, EL	CE04SXA 16V 100UF M	C508
117	CQ93PF2J223K	CAPACITOR, PP	CQ93 630V 0.022UF K	C509
118	CE04AN2A2R2M	CAPACITOR, EL	CE04SM 100V 2.2UF M	C510
119	CE04AN2C2R2M	CAPACITOR, EL	CE04SM 160V 2.2UF M	C511
120	CK45TN1H472Z	CAPACITOR, CD	CK45B 50V 4700UF Z	C701
121	CK45TN1H472Z	CAPACITOR, CD	CK45B 50V 4700UF Z	C702
122	CK45TN1H472Z	CAPACITOR, CD	CK45B 50V 4700UF Z	C703
123	CK45TN1H472Z	CAPACITOR, CD	CK45B 50V 4700UF Z	C704
124	CE04AN1E332M	CAPACITOR, EL	CE04SM 25V 3300UF M	C705
125	CE04AN1C100M	CAPACITOR, EL	CE04SXA 16V 10UF M	C706

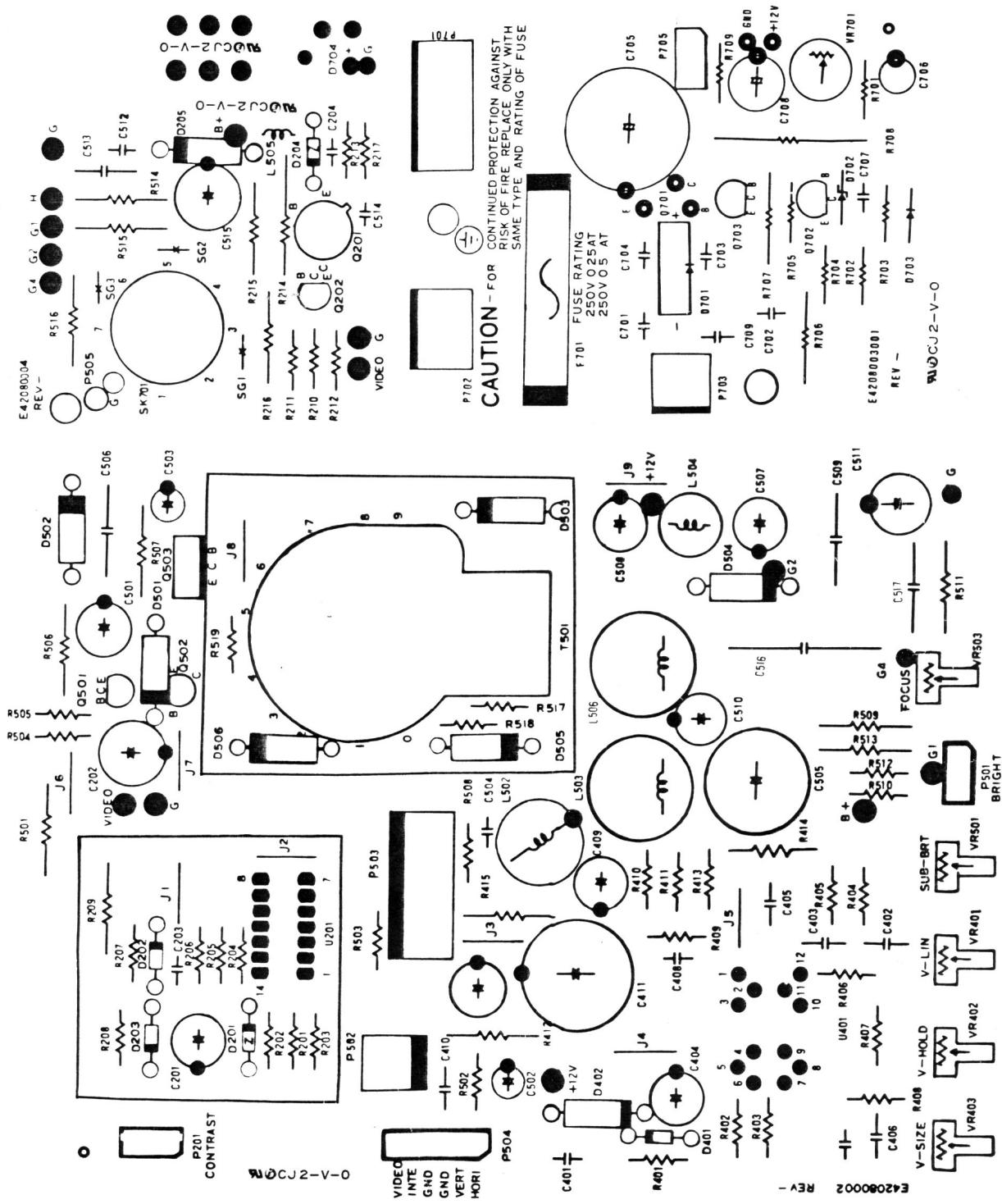
NO.	PARTS CODE	PART NAME	DESCRIPTION	LOCATION
126	CC45CN1H151K	CAPACITOR, CD	CC45CH 50V 150PF K	C707
127	CE04AN1C101M	CAPACITOR, EL	CE04SXA 16V 100UF M	C708
128	CK45FN1H103Z	CAPACITOR, CD	CK45F 50V 0.01UF Z	C204
129	CQ92BN2A223K	CAPACITOR, PE	CQ92 100V 0.022UF K	C512
130	CK45BN2H103K	CAPACITOR, CD	CK45B 50V 0.01UF K	C513
131	CC45CH1H820J	CAPACITOR, CD	CC45CH 50V 82PF J	C514
132	CE04AN2A220M	CAPACITOR, EL	CE04SM 100V 22UF M	C515

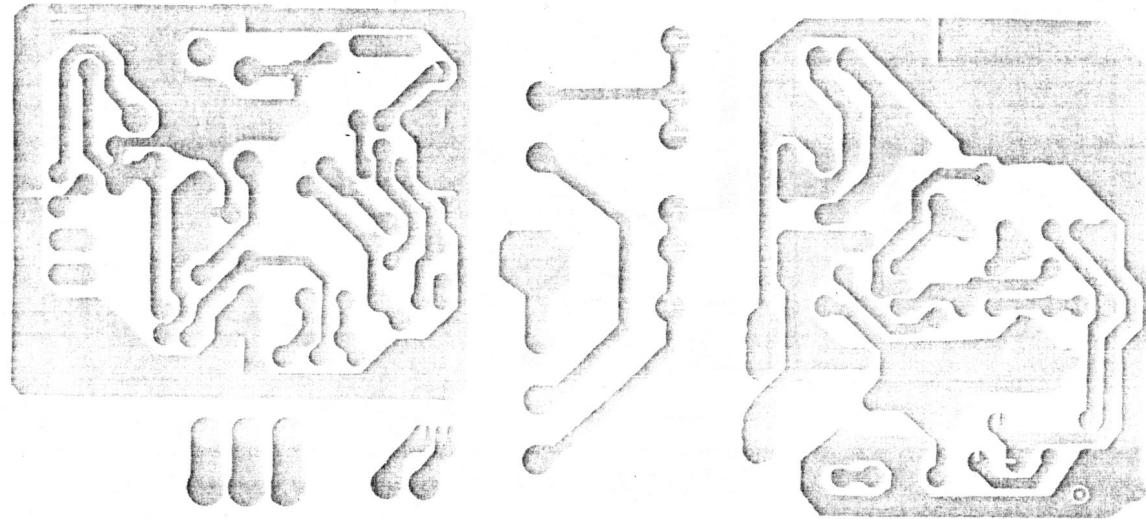
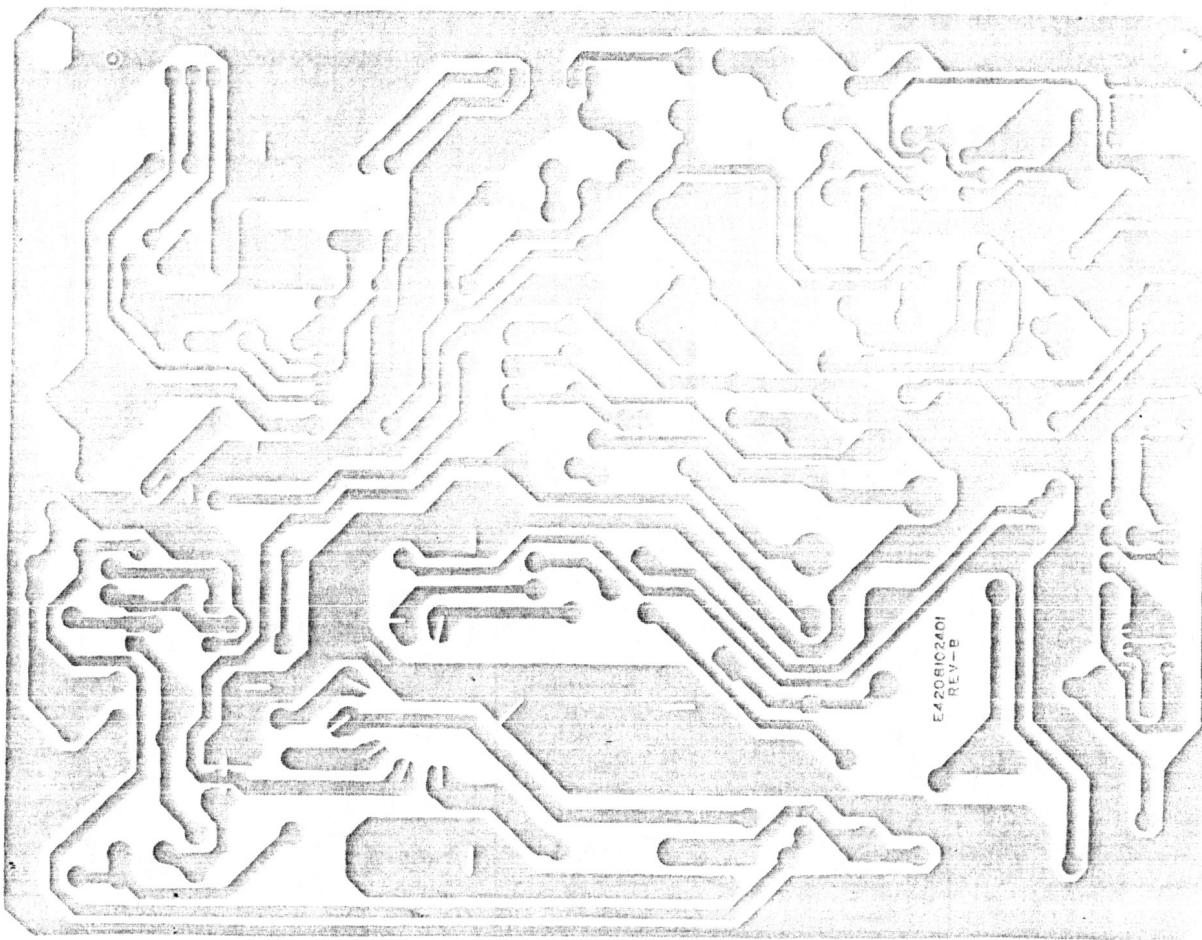
6. MISCELLANEOUS

NO.	PARTS CODE	PART NAME	DESCRIPTION	LOCATION
! 133	E42019005010	COIL-H-LINE	12PAI × 26mm	L502
! 134	E42019006010	WIDTH-H-LINE	16PAI × 41.5mm	L503
135	E42019007010	COIL-CHOKE	22uH 20%	L504
! 136	E42031001010	TRANS-FBT	TMF-2271	T501
	E42031001020	TRANS-FBT	KMF-21012	T501
	E42031001030	TRANS-FBT	FMD-1245DL(E)	T501
137	E42019001130	COIL-PEAKING	500D 4.7uH 10%	L505
138	E42039001010	SPARK GAP	1500V + - 500V	SG1
139	E42039001010	SPARK GAP	1500V + - 500V	SG2
140	E42039001010	SPARK GAP	1500V + - 500V	SG3
! 141	E42019004010	COIL-DY	TMD-2909	L501
	E42019004020	COIL-DY	KYS-20630	L501
	E42019004030	COIL-DY	DMK-1294	L501
! 142	E42031007010	TRANS POWER	57MM PHE-FG2-22(HPT-1210)	T701
! 143	E42025001020	FUSE		F701
144	E42076001010	CLIP FUSE	FC101(FC51E)	F701A
145	E42043027010	SOCKET-CRT	CS619	SK701
! 146	E4204501501A	CABLE SIGNAL	D SUB 9 PIN 125Cm	CB11
! 147	E42033001070	CRT	MP1216P39AU	1
! 148	E42043028010	SWITCH AC	SDWIP 4MM(SDS3P 4MM)	SW701
149	E42045021010	CORD ASSY	POWER SUPPLY CORD	1
		ASS'Y		
150	E42043024010	CONN. POST-2P	5273-02A	P502
151	E42043027050	CONN. POST-6P	5267-06A	P504
! 152	E42043003030	CONN. POST-3P	5096-03C	P701
153	E42043004010	CONN. POST-2P	5267-02C	P702
! 154	E42043024010	CONN. POST-2P	5273-02A	P703
155	E42043029010	CONN. POST-3P	5267-03A	P705
156	E42043029010	1 PIN	R93-31	P505
157	E42045068010	SHIELD	1007, AMG-24	J201
		WIRE ASS'Y		
158	E42045001040	WIRE	1007, AMG-24	J501
159	E42045001010	WIRE	1015, AMG-22	J503
160	E42045001050	3 PIN CONN.	5264-03, UL 1007	J705
		ASS'Y		
161	E42045001030	3 PIN CONN.	5264-03, UL 1007	Q701A
		ASS'Y		

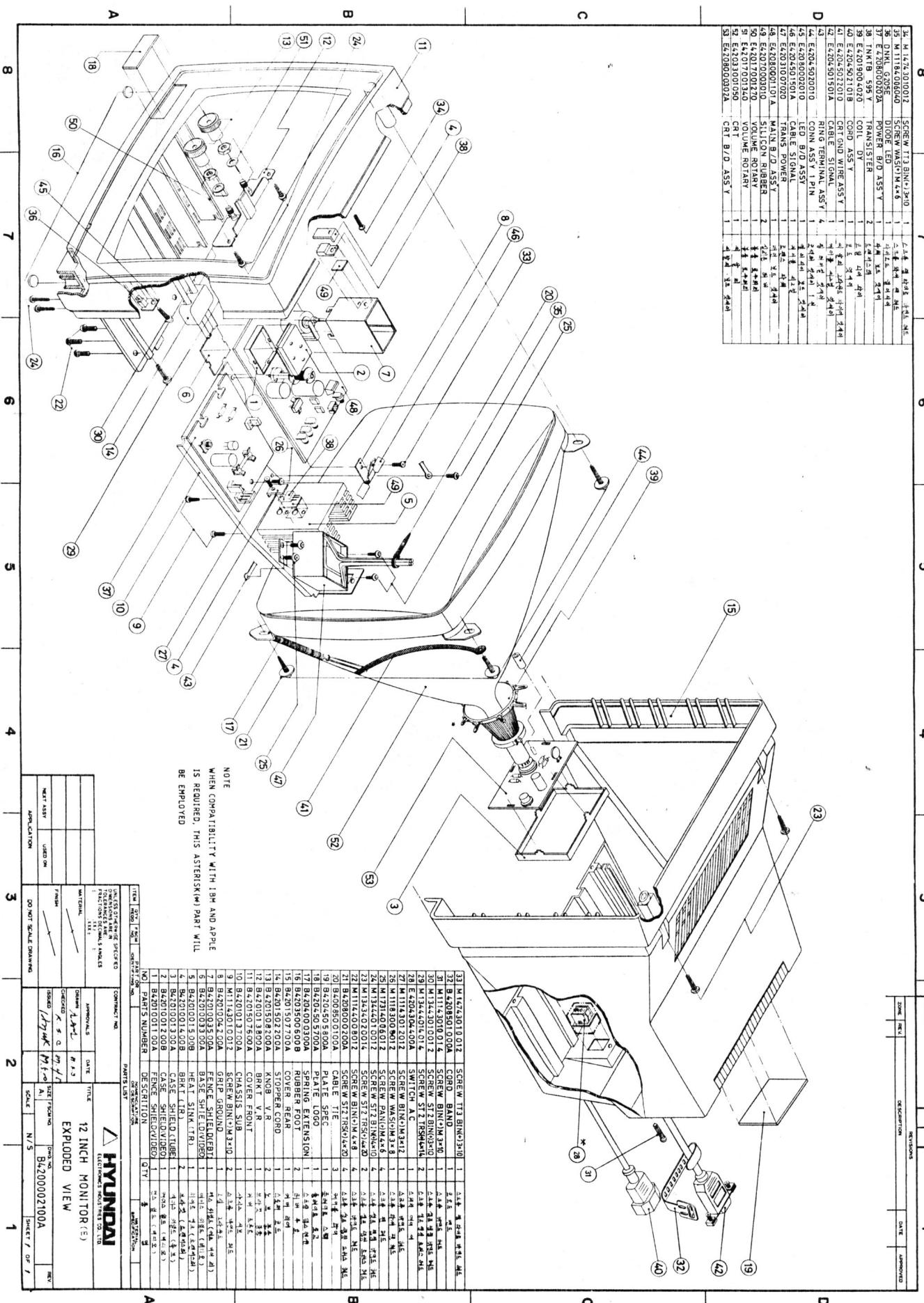
NO.	PARTS CODE	PART NAME	DESCRIPTION	LOCATION
162	E42045007010	2 PIN CONN. ASS'Y	5239-02, UL 1015, AMG-22	J502A
163	E42045020010	1 PIN CONN. ASS'Y	1619R	
164	B42045007018	PLATE LOGO	A1050P T0.4, DOUBL FACED TAPE	
165	B4204501201A	PLATE SPEC	LEXAN T0.128/ DOUBLE FACED TAPE	
166	E4209200502A	WARRENTY CARD	BCM/12G WARREMTY CARD	
167	E420900101A	MANUAL	USER'S GUIDE	

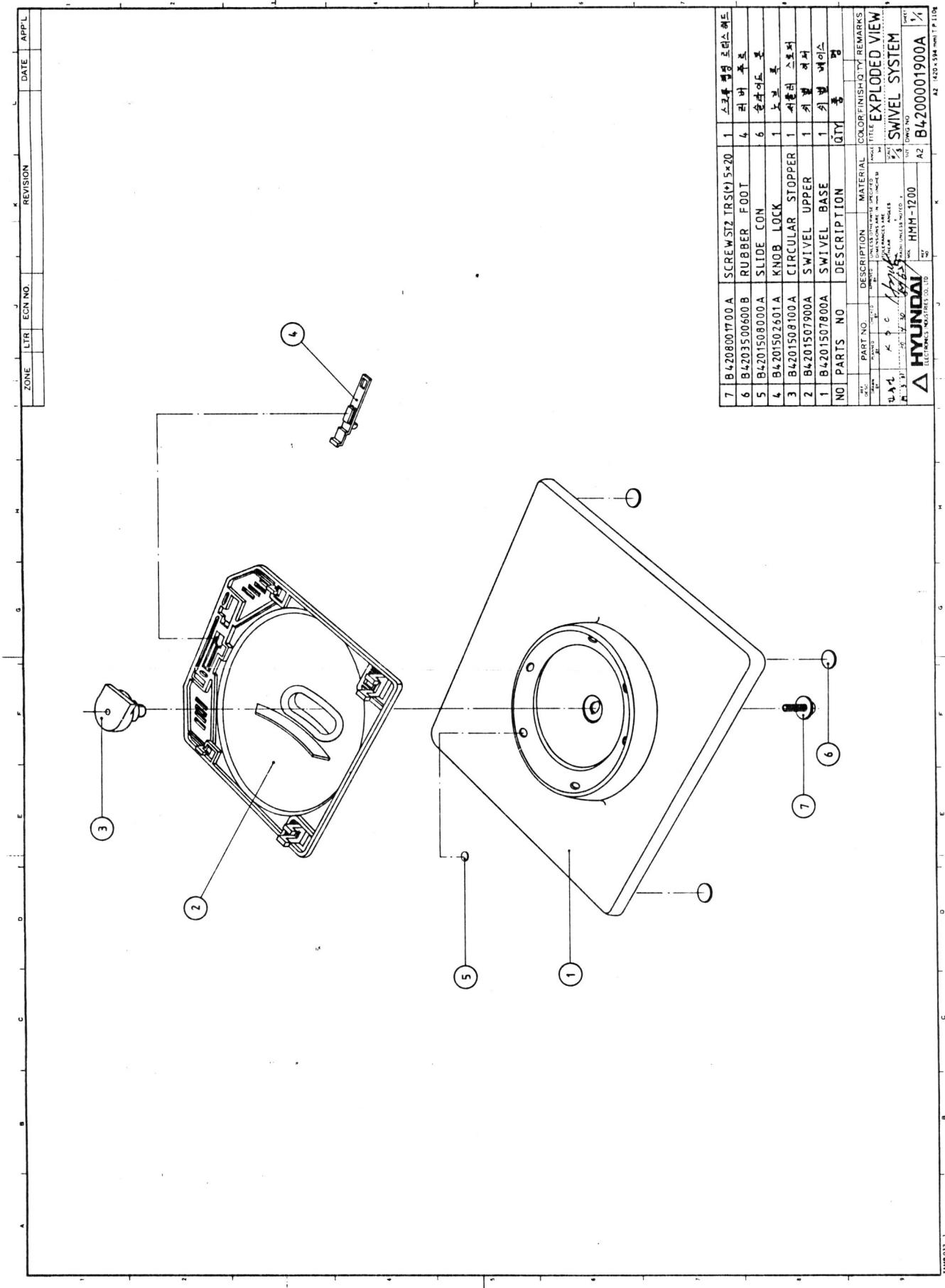
PCB LAYOUT





EXPLODED VIEW





BASIC Transistor Checking

NPN

<u>B</u>	<u>C</u>	<u>E</u>	
-	+		1K to 2K ohm
+	-		infinity
-	-	+	infinity
+	+	-	infinity 1K to 2K ohm
-			
+		-	infinity

PNP

<u>B</u>	<u>C</u>	<u>E</u>	
-	+		infinity
-	-		1K to 2K ohm
+	-		infinity
-	+	-	infinity
-	-	+	infinity
+	-	+	infinity
-			
+		-	1K to 2K ohm

E4209203400A

Printed in Korea